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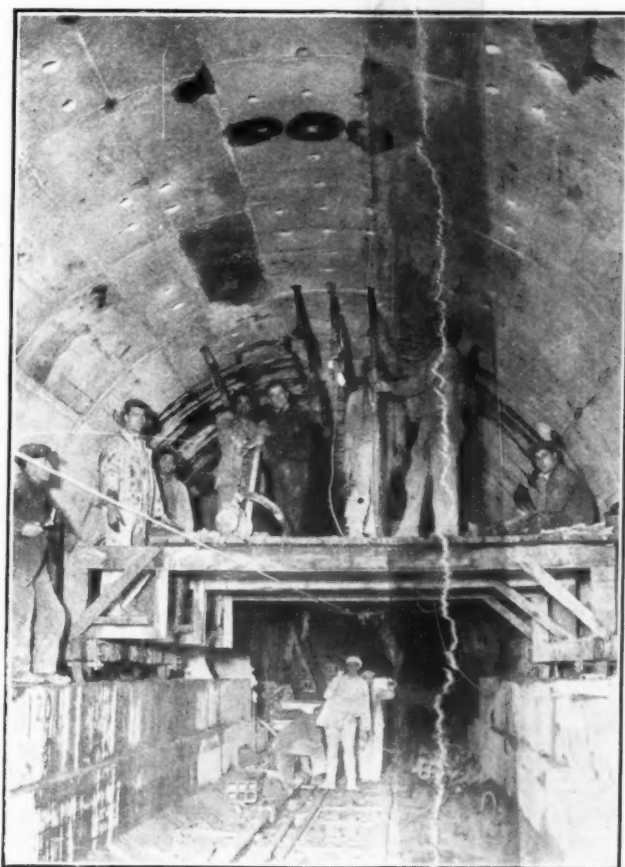
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A COMBINATION OF

"MUNICIPAL JOURNAL" and "CONTRACTING"



GROUTING THE LINING OF THE SUBWAY TUNNELS UNDER EAST RIVER, NEW YORK
This Work Will Be Described in a Later Issue of Public Works

IN THIS ISSUE

Accounting Forms on Construction Work
Garbage Incinerator at White Plains
Driving Long Battered Piles

Selecting Compound Meters
A Century of Immigration
Installing Pipes Through Railroad Embankments

OCTOBER 9, 1920

McKiernan-Terry Products

Success or failure nowadays depends largely on the selection of reliable labor saving equipment.

CORE DRILLS

McKIERNAN-TERRY DRILL COMPANY

ROCK DRILLS - PILE HAMMERS - BALL BEARING JACKS
MINING AND QUARRYING MACHINERY

15 Park Row, New York

Works: Dover, N. J.

SELLING AGENTS IN PRINCIPAL CITIES

Cable Address: Tenthredin, New York. Code: A.B.C. W. U. Lumber

BULLETIN No. 27

AUGUST, 1919

THE DOUGHBOY JACK

NEVER BACKS DOWN - NEVER TURNS AROUND



A powerful jack which carries a
greater load and of about one-half
weight of other jacks of equal capacity.

PILE HAMMERS

BULLETIN No. 25



McKIERNAN
DRILL

HAMMER DRILLS

BULLETIN No. 26



McKIERNAN-TERRY
DRILL COMPANY

McKIERNAN-TERRY PRODUCTS have made good wherever used. If you are unacquainted with them, write for any of the bulletins shown on this page.

McKiernan-Terry Drill Company

17 Park Row

NEW YORK

PUBLIC WORKS.

CITY

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A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 49

FLORAL PARK, OCTOBER 9, 1920

No. 15

Garbage Incinerator at White Plains

•Garbage, rubbish and ashes burned in a twenty-ton incinerator costing \$12,500. Mixed refuse is now collected by contract for one year, but city may adopt municipal collection

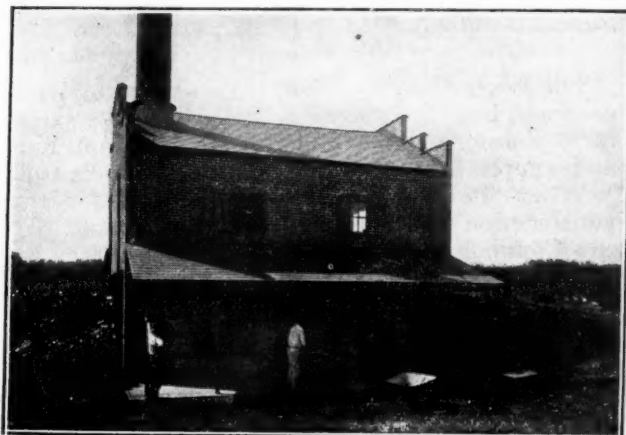
For a number of years the city of White Plains, New York with a population of 22,000, has been disposing of garbage and ashes which it collected by filling in such low places in the city as could be found. Public sentiment and complaints from citizens in the vicinity of the dumping grounds convinced the officials some time ago that it was necessary to change this procedure and build an incinerator.

It was decided to erect the incinerator building upon a lot of approximately three-quarters of an acre situated in the extreme eastern part of the city, immediately adjoining other property owned by the city on which was located a sewage pumping station. The cost of the ground was \$2,500. This location is apparently as advantageous as any that could have been selected for that purpose. The old portion of the city, where the bulk of the residences and business buildings are, is bounded on the north, west and south by hills that are approximately 200 feet high. The location of the plant is such that the loads will not have to be drawn up hill from any point, although the length of haul averages perhaps about one mile. The plant is about 400 feet from the main highway, which is well paved.

The garbage and ashes are collected without separation at the present time under a contract, for which service the city pays \$1,500 a month. There is a provision in this contract by which separate collection may be made at an increased cost of \$100 per month. The public works commissioner, W. B. Lyon, is considering changing the system and having the collection made by the city, feeling that in the end this would be more satisfactory. Contracts can be let for only one year and he feels that it would be unreasonable to require the contractors to purchase trucks and other equipment of a modern nature when there is no certainty of the continuance of the contract.

The incinerator is the No. 11 type of the Nye Odorless Crematory Company, and has a guaranteed capacity of from 20 to 25 tons in 24 hours. In the test made for the city officials, 7 tons of mixed garbage and refuse was disposed of in 10 hours and no extra fuel was required. The officials considered this satisfactory and thereupon paid the contract price, \$12,500.

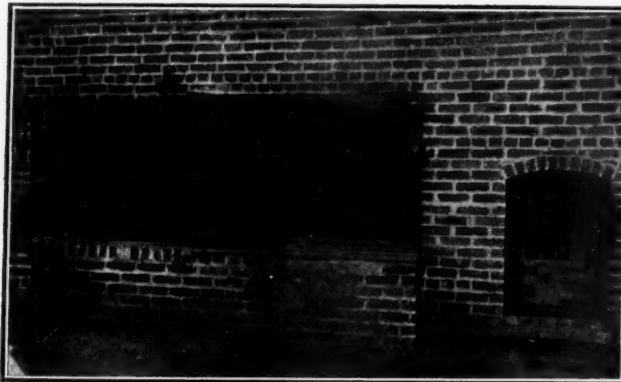
The commissioner of public works figures that when the plant is run for 24 hours, four men will be required and that the plant will take care of all of the garbage of the city.



EXTERIOR VIEW OF WHITE PLAINS INCINERATOR



CHARGING FLOOR OF INCINERATOR



DOOR FOR LARGE ANIMALS AT LEFT. FIRING DOOR AT RIGHT

The building which incloses the incinerator is 38 feet 6 inches by 29 feet 9 inches outside dimensions and is constructed of brick, with a slate roof. The main floor is of concrete and the charging floor is of reinforced concrete slab and beam construction and is 9 feet 10 inches above the ground floor. The furnace proper is 13 feet wide by 14 feet 4 inches inside. One half is provided with a grate consisting of 28 double bars (56 bars in all), while the other half is floored with brick. Over the grate bars, in the charging floor above, is the charging chute, while over the brick floor, which is used as a drying hearth, is a wet garbage chute. There are two firing doors on the long side of the grate and one firing door and air duct at each end. At one end of the drying hearth is a door 4 feet by 2 feet 6 inches which is used for placing large animals on this hearth, while at the opposite end of the hearth is a small door and opposite it a hand winch used for drawing the animals through the large door onto the

drying hearth. Back of the drying hearth is the chimney, which is 2 feet 6 inches in diameter, constructed of steel with a fire-brick lining $4\frac{1}{2}$ inches thick. Garbage wagons are driven up a ramp onto the charging floor, dump their garbage and drive out the rear door and around the building to the main entrance to the property. The garbage is raked from the floor into the charging chutes in the quantities desired.

The contract for the incinerator was a very simple one. It required that the company furnish a "standard brick incinerator of the Nye Odorless Crematory Company," the city furnishing the site and removing all trees, rock, etc., and making the site ready for building operations, grading and making the necessary roadways. The company agreed to demonstrate that the plant has a capacity of 20 to 25 tons of "average city-run garbage, trash, waste paper and dead animals per day." For making the test, the city was required to deliver to the crematory such available city-run garbage, etc., and fuel (if needed) as was necessary for testing the crematory, and also to furnish the services of two men so that the company's representative, while testing out the crematory, could teach the city's operators how to use and operate it. The company guaranteed the crematory to burn the matters named "without obnoxious odors from furnace or smokestack, when operated according to direction." It agreed to furnish and equip the building and incinerator in 120 days, but, owing to certain conditions beyond the control of the contractor, it required about two weeks longer to complete it. The commissioner of Public Works seems to be thoroughly satisfied with the plant, which has now been in operation for several weeks.

Accounting Forms on Construction Work

By Allen Henry Wright

Methods followed on the municipally owned project at Barrett Dam, in California.

Among the many problems to be handled upon any large construction project is that of mess accounting, and this is true whether the project is being carried through under contract or by day labor under a general superintendent.

One of the chief construction jobs now in progress in Southern California is that at the Barrett damsite, on the water conservation system belonging to the city of San Diego. The hydraulic engineer in charge of the work is H. N. Savage, who, in 1919, completed the new Lower Otay dam, also on the municipal water system, and who had been employed on many large projects throughout the southwest and the northwest.

The lower Otay dam had been started under a contract, but the contractor failed to make satisfactory progress and the job was taken from him and completed under Mr. Savage's direct control.

When the million dollars was voted for the construction of the Barrett dam, it was decided by the Common Council of San Diego to carry on the work by day labor rather than under a contract, and Mr. Savage was continued in the city's employ as hydraulic engineer.

Upon the Barrett dam project a system of accounting forms which had been in vogue at the Lower Otay work was continued, with improvements, and as these forms have proved so satisfactory here it is believed that they may be

adaptable to other large projects in the country. The Barrett dam project being wholly a municipal matter, the forms in use there are naturally inter-departmental in their nature, but the general idea can be carried out on any contracting job.

On this project the chief steward submits a daily mess report (see Form No. 7) covering the five meals served during the twenty-four hours (the job being carried on under two shifts), his form card showing the number of men served at each meal, whether at the \$1.15 or the \$1.25 per day rate, the number of meals served the mess force, the names of guests served and the number of meals served them and the account to which their meals are to be charged.

The chief clerk on the project keeps a continuous inventory of mess stock, and prepares a monthly statement showing the range in prices and the cost per meal per capita. From his May report, for instance, it is found that a total of 5,870 meals bringing in revenue and 1,294 meals, non-revenue returning, were served, making an average of 1,058 meals served per mess employee.

The unit cost per meal served during May was \$.4108, which showed a net loss per meal of \$.0214. In computing the cost per meal, the following enter into the total: Supplies, food, \$.2973; supplies, fuel and miscellaneous, \$.0075; freight and handling, \$.0101; labor, \$.0818; overhead, \$.0047; depreciation (estimated on a basis of writing off full cost of mess-house and equipment during the life of the project), \$.0094. The actual revenue received for each meal served is \$.3894; and this being an established price, there is a variation from month to month in the loss or gain per meal served, accordingly as the price of food-stuffs advances or drops.

It is interesting, in this connection, to note the fluctuation in these prices during the period between December, when the work on the project was started, and May. Sugar showed an advance of 110%; flour, 14%; potatoes 117%; condensed milk, a decrease of 25%; beef, increase of 10%; ham, 27%; bacon, 25%; macaroni, 15%; butter, decrease of 13%; eggs, a decrease of 33%.

In connection with the Barrett project there is conducted a commissary store, and the men in charge of this make a daily report through the chief clerk, showing cash on hand and the receipts from various sources, with a balance struck at the close of each day's business. (See Form No. 10.)

Each man on the project has an individual card in the office records, and to it are posted each day a record of hours worked, as shown by the time-keeper; the rate of pay, deductions for board, rent of room, ticket-books for use at commissary, transportation, etc. (Form No. 21) If an employee terminates his services before the regular bi-weekly payroll goes into the office of the city auditor, he is given a special card (Form No. 27) which he can present for immediate payment. This card shows, in condensed form, the data which appear on the serial card in the office of the chief clerk on the project. There

is also a form (No. 28) which each employee must present to the city auditor in any case before he can draw the money set out on the regular payroll. This guards against any unauthorized person calling for a pay warrant due an employee.

Throughout every phase of the Barrett project are used forms of one kind or another, but every one has its purpose and value. Among these other forms are those kept for daily reports by the powderman in charge of explosives (Form No. 3) and the foreman of the stables (Form No. 2.)

With the use of all of these forms and the tabulations which can be compiled from them, there is at hand, on a moment's notice, any information as to the cost of the project as it advances, knowledge of which might be desired by any city official. When once systematized, the work of handling the forms becomes but a part of the routine of the day, with results of great value, especially where a project is being carried on under a specified bond issue, with that issue the limit for expenditures for the entire work.

DESCRIPTION OF FORMS

Form No. 2—**Team Report.** This contains the date and eight vertical columns, four headed A. M. and four P. M. Each of these four contains the column heads "Job No.," "No. Head," "No. Hours," 4th column blank.

There are six blank horizontal lines, followed by one for "Idle" horses and an eighth line for "Totals." Under this a "Feed Report" containing four columns headed "On Hand," "Received," "Fed," "Balance,"

[illegible]

FORM NO. 21—WORKMAN'S INDIVIDUAL CARD

<p>Form No. 17</p> <p style="text-align: center;">Barrett Dam.....192</p> <p style="text-align: center;">Present to SUPERINTENDENT OF CITY PURCHASES DEPT. San Diego, California, for approval, Certification for IMMEDIATE PAYMENT by CITY AUDITOR, on account of services terminated at BARRETT DAM.</p> <p>Issued to.....</p> <p>Occupation.....</p> <p>For Services as Below:</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td> </tr> <tr> <td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td> </tr> <tr> <td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td> </tr> <tr> <td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td> </tr> </table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																16	17	18	19	20	21	22	23	24	25	26	27	28	29	30																<p style="text-align: right;">SERIAL No. P. R. No. REQUEST NO.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%;">No. DAYS</th> <th style="width: 20%;">RATE</th> <th style="width: 20%;">AMOUNT</th> <th style="width: 40%;"></th> </tr> <tr> <td> </td><td> </td><td> </td><td> </td> </tr> <tr> <td colspan="4" style="text-align: center;">DEDUCTIONS</td> </tr> <tr> <td>BOARD</td><td> </td><td> </td><td> </td> </tr> <tr> <td>RENT</td><td> </td><td> </td><td> </td> </tr> <tr> <td>STONE</td><td> </td><td> </td><td> </td> </tr> <tr> <td>BUS</td><td> </td><td> </td><td> </td> </tr> <tr> <td>GARAGE</td><td> </td><td> </td><td> </td> </tr> <tr> <td>GAS AND OIL</td><td> </td><td> </td><td> </td> </tr> <tr> <td>MISCELLANEOUS</td><td> </td><td> </td><td> </td> </tr> <tr> <td>TOTAL DEDUCTIONS</td><td> </td><td> </td><td> </td> </tr> <tr> <td>NET</td><td> </td><td> </td><td> </td> </tr> <tr> <td colspan="2">Computed by</td> <td colspan="2">Checked by</td> </tr> <tr> <td colspan="4"> <p>Authorized by H. N. SAUNDGE, Hydraulic Engineer.</p> <p style="text-align: center;">By.....</p> <p>Certified Correct E. B. WILLIAMS, Asst. Purchasing Dept.</p> <p style="text-align: center;">By.....</p> <p>Signature of Paper</p> </td> </tr> </table>	No. DAYS	RATE	AMOUNT						DEDUCTIONS				BOARD				RENT				STONE				BUS				GARAGE				GAS AND OIL				MISCELLANEOUS				TOTAL DEDUCTIONS				NET				Computed by		Checked by		<p>Authorized by H. N. SAUNDGE, Hydraulic Engineer.</p> <p style="text-align: center;">By.....</p> <p>Certified Correct E. B. WILLIAMS, Asst. Purchasing Dept.</p> <p style="text-align: center;">By.....</p> <p>Signature of Paper</p>			
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Month of 192

FORM NO. 27—SPECIAL PAYMENT CARD

with two horizontal lines "Barley—No. of Sacks," "Hay—No. of Bales." This is signed by the foreman.

Form No. 3—"Daily Explosives Report." This is divided into three parts, "Explosives Used" and "Explosives Received." The first contains columns headed, "Job No.," "40%," "5%," "Blasting Caps," "Fuse," "Exploders." Under "Explosives Received" are the same headings, except that the first column is headed "Requisition No." This is followed by Remarks, date and signature of powder man.

Form No. 7—"Mess Report." This is divided into two vertical sections, one for recording the number of meals and the other the guests served. The former contains four columns headed "\$1.15 Meals," "\$1.25 Meals," "Mess Force" and "Total"; with space for recording the number for each of the five meals indicated as A. M., Noon, Afternoon, P. M. and Night, and a total footing. Under the heading of "guests" is entered the "Name," "Meal" and "Account."

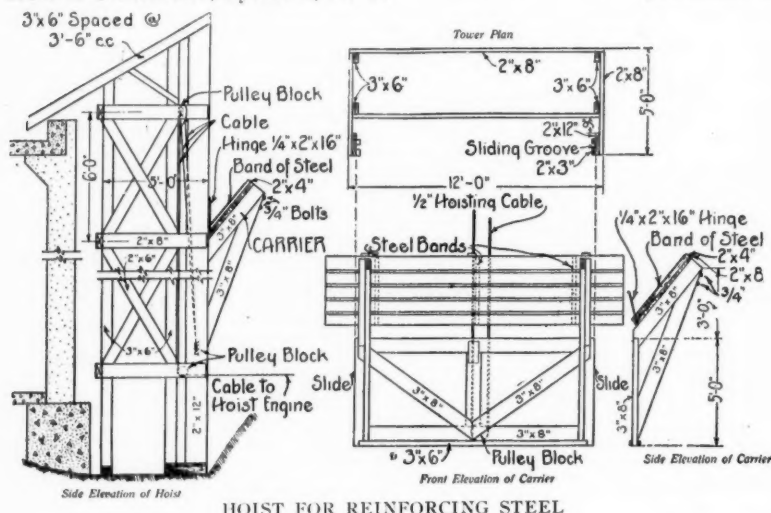
Form No. 10—"Daily Commissary Report." This contains two columns, one for items and the other for totals, with horizontal lines for each of the following: "Cash on Hand," "Cash Receipts—Commissary," "Pool," "Barber," "Charge Items," "Coupon Receipts," "Total Sales," "Total Cash," "Cash Turned in," "Coupon Redemptions," "Total Credits," "Cash on Hand." The cash on hand at the beginning and end of the day, total cash and total credits, and barber, are entered in the total column, the others in the item column.

Form No. 28—Auditor's order. This contains the date followed by the words: "H. L. Moody, Auditor: Please pay bearer.....whose signature appears below, the amount due him on pay roll No.Page No.Line No. This is followed by an itemized statement with the following items: "Net payroll amount due," "Less further deductions from warrant for Meals," "Bus," "Miscellaneous," "Total deductions from warrant," "Net amount due payee." At the bottom is space for signature of the chief clerk and of the payee.

Reinforcement Hoist*

For the handling of more than 500 tons of reinforcing steel and more than 200,000 feet of lumber used in the construction of the 60 x 700-foot 5-story "Victory" building at Johnson City, New York, there was installed a 12 x 5-foot wooden hoisting tower with a pair of vertical guides off-set about 18 inches on centres from the corner posts of the 12-foot outer space of the tower.

*Excerpt of article in the *Contractors Atlas*, by C. A. Geupel, construction manager, Tompson & Binger Engineers & Contractors, Syracuse, N. Y.



HOIST FOR REINFORCING STEEL

The carrier consists of an inclined 3 x 14-foot platform mounted on the top of a braced framework that engages the hoisting guide. The long units of steel, timber or other material that are placed on the platform may project beyond it at both ends and are securely retained in the V-shape space between the platform and the space of the tower, besides being secured at the lower part by the 15-inch loose leaves of strap hinges fastened to the platform.

The hoist line is attached to the lower part of the platform framework so that it can elevate the platform above the sheave over which the cable returns to the hoisting engine and thus raise the platform to the top of the tower to register with the projecting side of inclined skids which cap the tower. On reaching this position, the loose leaves of the strap hinges automatically revolve down into contact with the tops of the skids, release the material on the platform, permitting it to slide on steel bearing strips and be discharged over the skids to the required position in the building.

The tower may be designed so that a concrete bucket can be hoisted inside while the steel hoist is operated outside.

U. S. Bureau of Labor Statistics reports a decrease in number of employees on payrolls of 10 out of 14 representative industries in August, 1920, as compared with July; automobile industry showed decrease of 10 per cent; woolen industry, 6 per cent; leather industry, 5 per cent; car building showed increase of 3.5 per cent and paper making 1.5 per cent. This should release men for employment on construction work.

Ice Cores for Concrete

A novel suggestion has been made that hollow concrete be constructed with ice cores that will automatically remove themselves after the concrete has set, by melting and draining through small outlets left for the purpose. If successful, this would permit the construction of practically closed concrete chambers and eliminate difficult and costly stripping of the interior forms. The presence of the water would probably be beneficial rather than injurious in that it would promote the satisfactory hardening of the concrete.

Theoretically the suggestion seems possible and might be practical as well in latitudes where there is available an unlimited supply of thick ice to be had for the cost of cutting and handling. With ice at such prices as it commands in most American cities and requiring to be hauled, assembled and fitted in position, it is doubtful whether much practical use could be made of it for this purpose in large construction.

There are, however, various cases in which it might prove exceedingly advantageous, as for instance, in making small hollow blocks for spe-

cial structures where it is desired to have an inaccessible hollow interior that would justify considerable expense in providing a self-eliminating core. For construction where a large hollow space is required, interior forms might perhaps in some cases be built with walls of ice laid up like stone masonry, cementing itself together and braced occasionally by ice struts, construction of this sort having proved feasible and strong in the building of various Ice Palaces at Montreal and St. Paul. One thing is, however, certain namely that such forms for cores do not possess the advantage of steel forms for repeated re-use.

War Construction Justified

The reports dealing with the expenditures of the War Department on war contracts were reviewed by the Bulletin of the Associated General Contractors, which review is abstracted below.

The August bulletin of the Associated General Contractors, reviewing the "Graham" report of the select committees on expenditures in the War Department that accused the contractors for much of the important emergency work of inefficiency and dishonesty, analyzes it and the report of the non-partisan Board of Review of Construction, which, although received by the government August 30, 1919, long before the Graham report was written, was not made public until August, 1920.

This Board's report which was made by eminent disinterested engineers gives praise and appreciation to the contractors for their loyal services. The 400-page report itself is a record and analysis of construction policy, of great value to engineers and architects.

The principal charges of the Graham report are; that the chairman of the Emergency Construction Committee of the Council of the National Defense showed favoritism in the selection and rejection of contractors; that the chairman and committee wasted \$80,000,000 by the rejection of the competitive bids system and the adoption of the cost-plus-percentage form of contracts that encouraged inefficiency, the waste of materials, the dragging of work from job to job, petty graft, and the payment of exorbitant fees to contractors.

The Board of Review strongly recommended the employment of the most experienced persons securable, irrespective of business connections, and that large discretion and authority should be granted to them. It found that such construction work so placed was done with remarkable speed, was superior in quality, was characterized by economy of design, and was as

economically performed as the requirements for speed and other war conditions permitted.

Great care was taken in the selection of contractors and through data selected from questionnaires covering the magnitude and kind of work they executed, number of men employed, their financial resources and the reports from banks, financial agencies, customers and confidential sources, a list of 3,500 contractors was formed from which the most desirable were selected to execute the work. These were chosen with regard to a list of ultimate requirements, all of which had to be met and which included two years of successful contracting experience, the excavation of a \$500,000 contract, performance of work similar to that under consideration, possession of plant, proof of a capable organization, use of an accounting system satisfactory to the government auditors, the filing of a sworn statement of the work executed within the past two years, and the names and addresses of owners, engineers and architects in charge.

The finding of the Board of Review that the use of the cost-plus form of contract, if properly developed, is well justified and that it contributed to the success of the emergency construction program which could not probably have been performed as well and quickly without it or its equivalent, was practically endorsed by the report of a special committee of the presidents of the five great technical societies, the General Contractors Association, and the American Federation of Labor and building construction employees, who unanimously recommended the use of this form of contract, as equitable in operation and advantageous to the government.

The inefficiency of labor was attributed to the shortage of good labor, the use of floating labor, to the impossibility of penalizing inefficiency, and to the impossibility of carefully selecting men. The high cost of labor was due in large degrees to the necessity for overtime and the difficulties in keeping the men on the job.

Several investigations of specific materials showed that the carefully recorded waste amounted to about 6 to 10 per cent. The normal waste of lumber on work of this character was fixed at 10 per cent. As lumber formed the largest item of material used in camp and cantonment construction, it is considered representative of other materials. The committee found that it was often thought to be for the government's interest to keep together and transfer to new work, the organization of a contractor and government constructing officer that had already secured good results, thus disposing of the charge of dragging the work along to employ the contractor's forces.

The board found that there was very little evidence of deliberate plans to cheat or defraud the government, the percentage being sub-normal.

For the 16 national cantonments, it was estimated that the contractors' fee averaged less than 2 per cent net profit, an amount that was still farther reduced by federal taxation. For the much less costly national guard camps, the average fee was 6.88 per cent of the cost, and on some

of the larger projects, the gross fee of the general contractor was about 1¼ per cent, from which he had to meet his own expenses and taxes.

That the money was well expended is obvious from the fact that the total cost of the cantonments was about \$200,000,000, and as the average daily cost of the war to the United States was about \$30,000,000, the total cost was justified had it shortened the war by only one week. They were actually completed in time to give service of inestimable value during the winter of 1917 and 1918. Without the extreme rapidity of construction, it is believed that the housing would have been greatly delayed and with it the embarkation of American troops, forming a condition that might have seriously influenced the issue of the war.

San Francisco's Municipal Railways

The following letter has been received from Paul Eliel, director of the San Francisco Bureau of Governmental Research, "an incorporated, non-partisan citizens' agency to study public business, co-operate with officials, and specifically work for economy and efficiency in municipal affairs."

My Dear Sir:

In your issue of September 4th I note an article in regard to the San Francisco Municipal Railways. The results of last year's operation actually show a cash deficit after the payment of operating expenses, bond interest and redemption, depreciation and accident reserve and other expenses, of slightly in excess of \$16,000. The charter of the city requires the road to show in the operating statements certain so-called comparison charges. These charges are those which the road would be required to pay if it were operated under private management. They amount to something in excess of \$205,000 per annum. In other words, if the road had been privately operated the loss for the past year would have been in excess of \$220,000.

There has really been no agitation in San Francisco for the installation of one-man cars. The failure to put them on is not due at all to the fear of the supervisors that a considerable number of employes would have to be discharged, but is due entirely to the fact that, with one or two exceptions on extremely short and unimportant lines, the nature of the territory traversed by the city lines is such that the use of one-man cars would be inadvisable.

The statement that fares are not raised because it would increase the income of the privately operated company which would not raise their fares, is, I believe, entirely erroneous. The privately operated United Railroads would be more than glad of an opportunity to raise their fares, as their loss far exceeds that of the city. They do not feel, however, that they can apply to the Railroad Commission for an increase until the city has made the first move.

Finally, although it is true that certain amount of money has been transferred from the Depreciation Fund to the Operating Fund, in order to care for the increased pay of platform men granted more than a year ago, the past accumulation in the Depreciation Fund has not been affected; and on account of the method of accumulating the Depreciation Fund as a percentage of gross operating revenue, with the steadily increasing revenue, the amount actually transferred to the operating account has not materially affected the amount which formerly should be in the Depreciation Fund.

A recent proposal to raise the platform men to \$6.00 per day, and to secure the additional revenue from the Depreciation Fund, was denied, and I believe it is now generally recognized that if any increase in wages to the platform men is to be paid, it must come through an increase in fare.

Very truly yours,
PAUL ELIEL, Director.

Driving Long Battered Piles

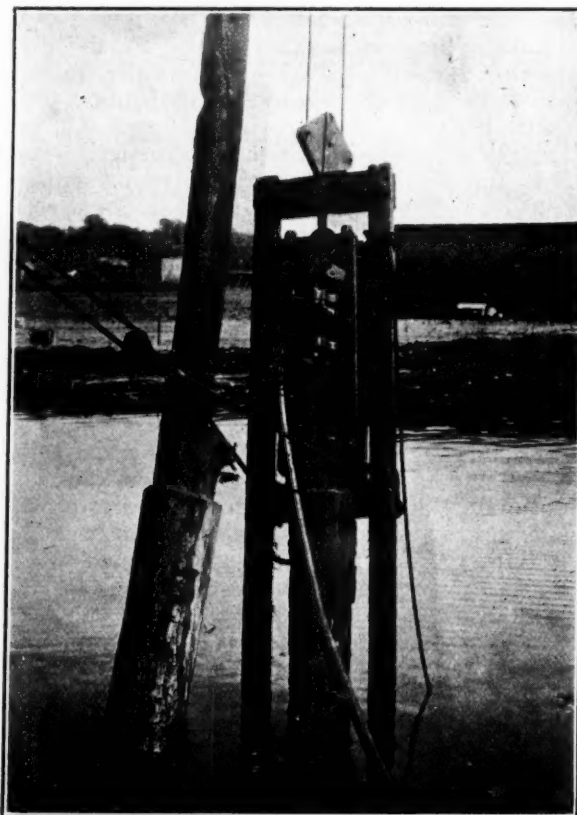
Steam hammer in short swinging leads suspended from derrick boom.

In the construction of the barge canal terminal in Flushing Bay, Flushing, Long Island, the McHarg-Barton Company, New York, have driven a large number of long foundation piles, including several hundred spur piles 17 to 19 inches in diameter and 80 to 85 feet long, which are inclined about two horizontal to six vertical.

They are driven to an average penetration of 55 feet through clay and mud strata to bearing in a heavy blue clay, without the use of a pile-driving tower or the elaborate mechanism often employed for driving battered piles.

The water is 14 feet deep at low tide and 20½ feet deep at high tide, and the piles have a 6-foot cut-off making an approximate total of 26½ feet which is not driven. Subtracting this amount from the pile length gives the penetration of 53½ to 58½ feet.

The piles are set in position by a floating derrick and penetrate the mud several feet by their own weight. The tops are guyed and pulled into position giving approximately the required angle, at which they are maintained by the guy ropes while the pile is driven by No. 7 McKier-



STEAM HAMMER AND WAYS ATTACHED TO PILE TOP

nan-Terry double-acting steam hammer making about 225 strokes per minute. The hammer weighs 5,000 pounds and the striking part weighs 800 pounds, giving it a high efficiency which drives the piles at an average rate of 32 in one 8-hour shift. The refusal point was when the piles had been driven so they would not move over 1 inch under 100 blows of the hammer with steam pressure at 90 to 100 pounds.

The pile hammer operates in a pair of 6 x 6-inch swinging timber leads or guides, with 2-inch planking extending about 8 feet below the butt of the pile, thereby affording a better support for same. The leads and hammer are handled by a hoisting tackle operated from the end of a 78-foot derrick boom, which is very quickly adjusted to the required position for successive piles. The swinging leads were not attached to the top of the pile but were suspended from a direct line in such a manner that they maintained the desired inclination at which the pile was to be driven. The hammer was also free to work up and down in the short leads. At the bottom end of the leads there was a half round iron strap which permitted of the leads being pulled up against the pile so that they centered with the pile top for driving.

The efficiency of the driving is demonstrated by the fact that several piles of similar lengths and character in the same locality that had been driven to refusal with a 3,600-pound drop hammer were, after they had set for more than six weeks, driven about 1 foot deeper by the hammering above described.



DRIVING SPUR PILES WITHOUT TOWER. HAMMER SUSPENDED FROM DERRICK BOOM

This unique method of operating the hammer was designed, constructed and operated by J. S. Mosher, superintendent of McHarg-Barton Company, New York, contractors for the work.

Motor Fire Apparatus and Fire Stations

In his report for the year 1919, the superintendent of the Department of Public Safety of Easton, Pa., W. P. Strickland, cites several instances in support of his contention that the use of motor fire apparatus by that city permits a reduction in the number of fire stations that were used when horse-drawn apparatus was relied upon exclusively. He states that "The equipment carried by a modern motor apparatus is equal to that formerly carried on three pieces of the old style horse-drawn apparatus, to say nothing of the greater advantage of reaching the scene of the fire more quickly. Besides that, every fireman responding to an alarm goes into active service the instant he reaches the scene. No time is lost in looking after the horses, as was the case in former days. Any portion of the city, as comprised within its present limits, can be reached by apparatus from the central station in five minutes."

The records show that in the case of alarms from the furthest possible locations in one section of the city, apparatus reached the box and sent backtaps in seven minutes in one case and ten minutes in another after the alarm had been sent in. From the furthest box in another section backtaps were sounded within nine minutes, and the longest period from the furthest box in still another direction was six minutes.

"It having been shown that the motor apparatus is capable of reaching each and every part of the city within a very short period, the necessity of maintaining as many stations as we now have is not apparent. By the elimination of two stations we would save annually about \$2,500, which would meet the salaries of two additional permanent men." He recommends that, in addition to eliminating two stations, the call-men be dispensed with, as being unnecessary; in which case these two savings would permit the adoption of the two-platoon system.

Water Pollution Law of Rhode Island

Beginning September 1st there went into effect in Rhode Island a new law enacted by the latest legislature to regulate and prohibit the pollution of inland and tidal waters of the state. The act created a Board of Purification of Waters which will have practically unlimited power in investigating complaints of pollution of waters (except in the case of potable waters) and compelling the installation of such systems or means of preventing pollution as it may deem advisable. While in the past the courts have invariably granted the relief sought from improper use of streams, the laws have not been considered satisfactory and hence the new laws and the board to enforce them.

Water Metering in Watertown

The water department of Watertown, N. Y., has started the installation of 2,000 meters which they hope to have completed by the end of this year, 500 of them having already been installed. The superintendent of the department, J. W. Ackerman, reports that the meters have already reduced the average daily consumption of water by a million gallons a day, comparing the record for August, 1920, with the first seven months of this year and also with August, 1919, the consumption having been but little over five million gallons a day in August, 1920, while it was 6,450,000 gallons in August, 1919. It is expected that, as the number of meters increases, the decrease in consumption will continue and that by January of 1921 the consumption will drop to an average of four million gallons a day or less.

This lowering of consumption reduces the cost not only of pumping, but also of chemicals, which cost about \$8 per million gallons of water treated.

Water Works Department Aids City Finances

In his report for the year ending January 5, 1920, Samuel F. Hassler, superintendent of the Bureau of Water and Light of Harrisburg, Pa., reports that the water department from its reserve fund appropriated \$11,500 for the aid of other city bureaus which were temporarily embarrassed, the Bureau of Fire receiving \$4,000, Bureau of City Electrician, \$4,000, Bureau of Ash and Garbage Inspection, \$3,500. An ordinance was passed permitting this appropriation with the understanding that the amount was to be returned to the reserve fund of the water department at an early date.

Municipal Horseshoeing in Waltham

Waltham, Mass., maintains a blacksmith shop where is done all the horseshoeing and blacksmith work of all the city departments. During 1919 the blacksmith was engaged 1,032 hours at work other than horseshoeing for the Street Department and 464 hours for other departments, while presumably the rest of his time during the year was employed in horseshoeing. Four hundred and eight horses were shod at a total cost of \$975, this involving the placing of 1,084 plain shoes, 20 bar shoes, 20 drive calk shoes, 16 rubber pads, 313 leathers, 48 shoes reset and 58 shoes sharpened.

Refuse Collection in Waltham

In Waltham, Mass., the Street Department collects the ashes and refuse. Ashes are collected weekly, a given day being assigned for the work in each ward. During 1919 the department used for this work Autocar trucks for 166½ days, a Kelly-Springfield truck 2¼ days, double teams 511⅔ days, and single teams 9 days. The Kelly-Springfield truck collected 96 cubic yards in 12 loads, the Autocar trucks 6,591 cubic yards in 1,498 loads, the bottom-dump carts 12,173 cubic yards in 2,969 loads, the single tip-carts 56 cubic yards in 35 loads, and 1,500 cubic yards were collected in 300 loads by double sleds.

In the collection of refuse, the first four days of each week are devoted to stores and factories and the last two days to collections from residences. The rubbish is collected and disposed of at a dump, where it is sorted and the paper is baled and sold. Two men are employed on three public dumps. The total cost of labor at the dumps for the year was \$2,393.90.

Highway Construction Prices

The State Highway Commissioner of North Carolina has issued the following circular letter addressed to North Carolina Highway Contractors:

"As information concerning current prices in road construction, we beg leave to quote below the prices on which we have recently let contracts in this State:

Clearing and Grubbing, per acre	\$75.00	\$150.00	\$200.00
Common Excavation, cu. yd. ....	.54½	.58	.55
Borrow Excavation, cu. yd. ....	.54½	.58	.58
Solid Rock Excavation, cu. yd.	1.90	2.25	
Top Soil Surfacing, cu. yd. ....	.75	.72	.70
15 in. T. C. Pipe, Lin. Ft.		2.10	2.00
18 in. T. C. Pipe, Lin. Ft.	2.00	2.75	3.00
20 in. T. C. Pipe, Lin. Ft.			
24 in. Corrugated Pipe	3.00	4.00	4.00
15 in. Corrugated Pipe			3.50
18 in. Corrugated Pipe			4.00
Concrete Headwalls, Class B. cu. yd.	35.00	30.00	30.00
One Course Gravel Surfacing, cu. yd.	2.00		
Overhaul .....	.01	.04	.04
Concrete Structures, Class A.	35.00		
Reinforcement Steel .....	.11		
Bolts and Plates .....	.11		

Convict Labor on Kentucky Highways

The State Highway Commission of Kentucky is suing the State Board of Charity and Correction of that state to compel it to honor a requisition for 500 prisoners to work the roads next year. The board has refused to comply with such a requisition on the ground that there are no more than sufficient prisoners to fill the contracts with prison shops, to which the board is bound by contracts to furnish the prisoners desired to the extent that they are available. As it is necessary for the state to know in advance what next spring's program will be, this suit is brought for the purpose of clearing up the situation.

The state highway engineer, M. S. Boggs, says that the commission is planning to establish permanent road camps, eight camps this year having satisfied him that prisoners can be employed successfully in highway construction at a cost of \$1.50 a day. The commissioner of public institutions, Joseph P. Byers, is reported to desire to avoid the expense of sending the men out early in the spring and returning them to prison in the fall, as well as the disorganization of the contractors' plans by filling their shops for five months in the winter and then leaving them short-handed for the other seven months.

Contractors at present have less than two-thirds the number of men their contracts called for, owing partly to a reduction in prison population and partly to the fact that fifty men are working on the roads in several counties. The state has contracts for 1,625 men, with a prison population of only 1,133, of which 10 per cent are required for duty in the kitchens, engine rooms, dining rooms, hospitals, barber shops and offices.

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Municipal Bonds in Demand

The demand for bonds is increasing, and consequently their market value, and municipal bonds are leading the entire investment market. During September the market quotations on high-grade city and state bonds advanced as much as three or four points in the case of long-term issues. Moreover, the last few weeks have seen

a falling off in the volume of offerings of new issues of this kind, and the combined effect would seem to be inevitable further increase in value.

Prices of materials are going down, labor is becoming more abundant and reasonable, and the indications are that construction work can be carried on under much more advantageous conditions next year than this.

With these conditions prevailing it would seem to be wise for cities to prepare plans now for the carrying out of some, at least, of the several public works projects which almost every community has been postponing since the beginning of the war.

Factors in New Construction

Construction work which is to be undertaken or continued next season should be carefully planned in advance, and it is none too soon now to begin preparations for its most profitable execution and to decide what kind of work and how much is to be attempted and the methods best adapted for it. Before undertaking any construction work, consideration must be given to the class, amount, conditions of execution, the nature of the contract provision or type of contract, and payment, as well as to labor and materials required, and transportation and plant to be installed, all of which are vital factors in determining success or failure, any one of which may make all the difference between profit and loss.

The contractor should deliberately plan whether to engage in road construction, buildings, foundations, tunneling, excavation, concrete work, sewers, water works, or any other general type or special class of construction, according to his experience and equipment, and by timely preparation can usually secure the most advantageous sort of work and avoid that for which he is less experienced or which is less profitable.

The amount of work should bear a suitable ratio to his resources, equipment on hand and organization, and should generally not be great enough to extend over a period of more than one season or one year, unless provision is made for changed conditions in the future. The payments should, of course, be absolutely certain and terms should be so arranged that estimates are made as the work advances and sufficient to cover all of the labor and current supplies, leaving the contractor's assets free for emergencies and the purchase of plant and equipment. If possible, they should be arranged so as to make the heavy payments come early in the work and insure the actual cost of it, leaving a small and diminishing amount of retained percentage for final payment.

Conditions should include a careful survey of the field, an investigation (involving some expense, if necessary) of the natural resources like sand and gravel deposits, locations of spoil banks and borrow pits, storage yards, transportation facilities and subterranean explorations and a knowledge of local meteorological data, city ordinances and the like, together with any difficulties or advantages that may be anticipated and the

seasonable time for doing different portions of the work as well as the limited time for its completion, all of which should be scheduled in advance.

The forms of contracts and specifications are of great importance, particularly in work executed for new engineers or owners. No contract should be accepted that contains indefinite or ambiguous clauses or is unjust or unfair in its requirements, as some municipal contracts are notably. Especial attention should be paid to the effect of increasing or diminishing estimated unit quantities or to changes of location or design; and if the items of the contract involve uncertainties such as special danger from flood or quicksand or traffic or labor difficulties, the bids must be high enough on either lump or unit basis to provide for ample insurance, or else the contract should be taken on some cost-plus type of agreement such as is almost universally required now for very large or long-continued work.

Liberal estimates must be made for labor costs—increased wages, delay by strikes, and insufficient or inefficient employees. Competent superintendents and foremen should be certainly available and the leading men should be engaged in advance and employed as soon as possible on preliminary work, while the remainder of the forces are selected, organized and trained for most efficient service early in the execution of the work.

Materials should be contracted for as far as possible in advance, with deliveries provided as required. The contract should permit the quantities to be increased or diminished at a fixed price. When materials, such as sand, gravel, stone and timber can be supplied by the contractor, arrangements should be made in ample time for the location and opening of quarries and the installation of machinery.

Transportation should be provided for by routing different supplies far enough in advance to secure a choice between rail, water and highway carriage, and to permit delivery, if desirable, by automobile trucks, features that can perhaps be greatly modified by the ability to provide ample storage at the site.

Great importance attaches to the selection of plant and equipment, which should carefully be studied with a view not only to the most efficient and economical execution of the work, but also to the utilization of plant on hand, the purchase of standard equipment in the open market or from contractors completing their jobs, and to its future use or sale on the termination of the work in hand.

Boston Refuse Disposal Company to Quit

The company disposing of the refuse of Boston has notified the city that it will be unable to carry out its contract, which calls for continuing the disposal of refuse until July 1, 1922, and requests that it be permitted to cancel the contract effective April 1, 1921. If the city will consent to this, the company agrees to pay it \$100,000, which is the amount of its bond, and release all claim it

has to the buildings at Spectacle Island, where its plant is located.

This plant went into operation in 1912, although comparatively little actual disposal work was done the first year. It is reported that the city officials were under the impression that the company was making considerable money, but its recent action would indicate that this was not the case. Its own explanation is that, because of poor separation of the refuse into the several classifications of ashes, street sweepings, rubbish and garbage, especially the introduction of much solid matter into the garbage, the expense of treatment had been greater than anticipated and the machinery had been put into such condition that extensive repairs will be necessary at once if it is to continue operating for approximately two years more. In addition to this, labor has increased 150 per cent since the beginning of the contract, gasoline 240 per cent, coal 400 per cent, and the repair parts of the machinery also have increased in price as well as in the number it has been necessary to purchase. The company, The Boston Development & Sanitary Company, has nothing to do with the collection of the refuse, but receives it at the water front and takes it down the harbor to its treatment plant.

Mayor Peters had begun some action anticipatory of the expiration of the contract and was expecting to appoint a committee to consider the broad question of refuse disposal, with the idea that it would have nearly two years in which to study the problem. This action of the contracting company would seem to necessitate hastening matters, leaving only six months in which to prepare for some other method of disposal. It has been suggested that the city may decide to adopt incineration rather than utilization. The plant at Spectacle Island is said to have always given forth odors which have been seriously objected to by neighboring communities.

Philadelphia-Camden Bridge Commission

The joint bridge commission has been selected to have charge of the construction of the bridge to join the cities of Philadelphia and Camden, one of the most expensive bridge propositions now under consideration in the country. The engineers consist of George S. Webster, chief of the Bureau of Surveys, representing Pennsylvania; Lawrence A. Ball of East Orange, N. J., representing New Jersey; and Ralph Modjeski, consulting engineer of Chicago and New York, representing a neutral state. This commission is to "proceed with the work of preparing general plans and a report which shall include traffic census, land values, conditions of foundations and estimates of cost at the three most favorable sites, and the making of recommendations as to the location, height, structure, clearances, capacity, and such other details as may seem to them advisable in planning a bridge over the Delaware river between the cities of Philadelphia and Camden." The expenses of the preparation of the report are to be limited to \$100,000, of which the members of the board receive \$50,000.

A Century of Immigration

More than 33,000,000 aliens, 90 per cent of them from Europe, have arrived, mostly in four great waves with crests in 1854, 1873, 1882 and 1907.

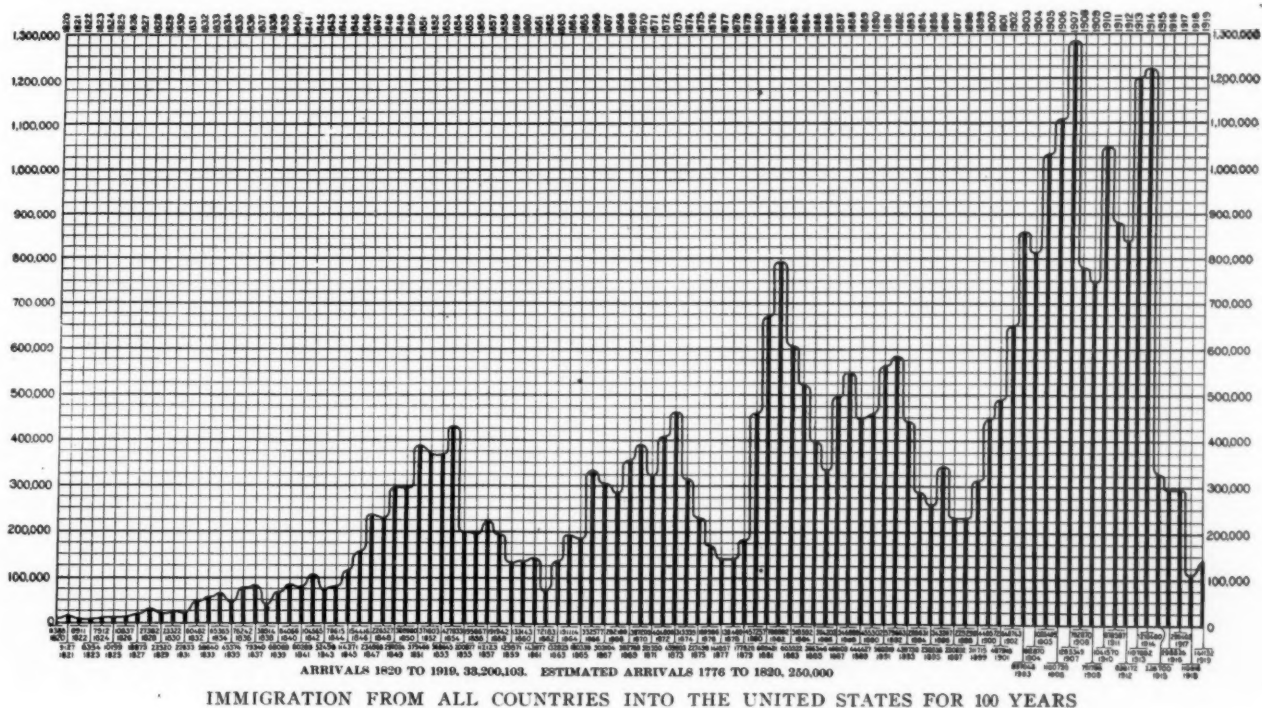
From the close of the revolutionary war until the war of 1812 there was a considerable but unrecorded amount of immigration into the United States. It decreased during the war of 1812 and after the close of the war in 1815, increased to 200,000 in 1817, a large proportion of the arrivals being sturdy, industrious workers. Nearly all of these became permanent residents and helped to settle and develop the country, as many have since done, but in a proportion decreasing as the area of unsettled territory and of free lands for homesteading has decreased. Meantime larger and larger numbers have been employed in mills, shops and on the vast amount of construction work that required men by hundreds and thousands and an increasing number have concentrated in the seaboard and other large cities. Many have been frankly migratory, remaining in this country only long enough to accumulate the desired amount of earnings which they have carried back to their native countries to invest.

In March, 1819, Federal legislation was enacted that regulated ship transportation of immigrants and provided for recording the number, age, sex and occupations of arriving emigrants. These records, since then much amplified, show

that from 1819 until 1919 there have landed in this country 33,076,813 aliens—a number nearly equal to one-third of the present population of the United States, which has increased about 97,000,000 since 1819.

The great majority of the immigrants have been day workers, common labor preponderating, with a goodly number of skilled laborers and artisans employed in special occupations and manufactures. They and their descendants have furnished a large proportion of the manual workers of this country, but in the degree that they acquire citizenship and Americanization, their children enter into more skilled pursuits. With the great increase of productive and construction enterprises, more and more skilled and unskilled laborers are wanted, the demand exceeds the supply and increasing numbers of industrious immigrants are more and more necessary, especially in the present condition of world-wide demands for American products and the urgency of catching up with our deferred maintenance and extensions of all sorts.

The accompanying chart, prepared by the U. S. Bureau of Immigration, shows graphically the varying rates and exact amount of immigration



Summary of Arrivals from 1819 to 1919

Country	Total immigration.	Per cent of total.
United Kingdom	8,205,675	24.7
Germany	5,494,539	16.6
Italy	4,100,740	12.4
Austria-Hungary	4,068,448	12.3
Russia	3,311,400	10.0
Scandinavia	2,134,414	6.4
Other countries	5,884,887	17.6

During the century more than 90 per cent of the immigrants came from Europe and 2.4 per cent from Asia.

The above data have been derived from the reports of the Commissioner General of Immigration, and are therefore authoritative.

FORECAST

From an analysis of the records and a study of political and industrial conditions in America and foreign countries, the Immigration Bureau concludes that, unless immigration is actually restricted by the United States or restricted or forbidden by European countries, it will greatly increase; the amount dependent largely on the ratio between inducements in this country and the holding power of foreign countries.

Although great discomfort and political unrest prevail abroad, the hope of improved future conditions may keep many of the immigrant class at home; while officers, landowners, small capitalists and others who most feel the burden of changed conditions may emigrate for relief; and this, it is believed, will cause a great increase of immigrants from that class in Germany.

When approximately normal conditions have been restored in central and western Europe, it is likely that Hungarians will find home conditions more favorable, and their immigration will be reduced. In Austria, the present economic conditions are likely to produce heavy emigration. Very large emigration may be expected from Russia, whatever may be the outcome of the political situation there.

Italy, one of the most densely populated countries in Europe, has hitherto furnished the third largest number of immigrants to the United States and notwithstanding heavy losses in man power during the war, is still over-populated and will almost certainly add a large number of immigrants in the future.

It is thought that Turkish immigration may become a factor in the alien exodus from the Near East. No especial change in the immigration movement from France is expected. Immigration from Spain and Portugal was not materially disturbed before the United States entered the war and it is expected it may resume normal conditions except as diminished by the operation of the illiteracy test. A continuance and perhaps an increase of immigration from Great Britain and Ireland is expected.

From the neutral countries a considerable influx of deferred immigration may be expected. It is thought, in the light of former experiences, that future immigration from enemy countries will not long be seriously deterred on account of war feelings.

While it is estimated that perhaps 8,000,000 men of the ages from which most immigrants come were lost in conflict, and many more were injured so as to make them inadmissible to this country, the heavy burdens that European countries must bear will make it so difficult to earn a living and so many men may be released by the disbanding of armies, that there will still be many immigrants available.

From all these conclusions the reader himself may deduce that the facts and conditions indicate a large potential supply of men who will desire to emigrate to this country and who will do so unless prevented.

Federal Electrical Railway Commission Report

Recommends control of service and rate, economical operation, improved equipment, expansion, fair profits, elimination of excessive assessments, regulation of competing automobile service, arbitration of labor disputes, reduction of capitalization, and private ownership.

The Federal Electric Railway Commission, appointed by President Wilson, May 31st, 1919, to investigate the street railway situation is composed of eight prominent men representing the principal interests directly involved, viz:

Charles E. Elmquist, president and general solicitor of the National Association of Railway & Utilities Commissioners.

Edwin W. Sweet, Assistant Secretary of Commerce, representing the Department of Commerce.

Philip R. Gadsdon, representing the American Electric Railway Association.

Royal Meeker, Commissioner of Labor Statistics, Department of Labor, representing that Department.

Louis B. Wehle, general counsel of the War Finance Corporation, representing the Treasury Department.

Charles W. Beall, of Harris, Forbes & Company, New York, bankers, representing the Investment Bankers' Association of America.

William D. Mahon, president of Amalgamated Association of Street & Electric Railway Employees of America, representing that association.

George L. Baker, Mayor of Portland, Oregon, representing the American Cities' League of Mayors.

Their report made public late in August contained the following conclusions and recommendations:

1. The electric railway furnishing transportation upon rails is an essential public utility, and

should have the sympathetic understanding and co-operation of the public if it is to continue to perform a useful public service.

2. The electric railway has been, and will continue to be, a public utility, subject to public control as to the extent and character of the service it renders, and as to the rates it charges for such service.

3. It is of the highest importance that both the total cost of the service and the cost to the individuals who use it shall be kept as low as possible without injustice to those who take part in producing it.

4. The electric railway industry as it now exists, is without financial credit, and is not properly performing its public function.

5. This condition is the result of early financial mismanagement and economic causes, accentuated by existing high price levels of labor and materials, and of the failure of the uniform unit fare of five cents, prescribed either by statute or by local franchise ordinances or contracts to provide the necessary revenues to pay operating costs and to maintain the property upon a reasonable basis.

6. The industry can be restored to a normal basis only by the introduction of economies in operation, improving its tracks, equipment and service, and securing a reasonable return upon the fair value of its property used in the public service when honestly and efficiently managed.

7. The electric railways must expand to meet the growing needs of their communities; therefore, the first essential is to restore credit in order to obtain necessary new capital for the extension and improvement of service.

8. Restoration of credit involves a readjustment of relations which will remove public antagonism, provide public co-operation, and insure to the investor the integrity of this investment and a fair rate of return thereon.

9. Effective public co-operation should be exercised by eliminating, in so far as it is practicable, special assessments for sprinkling, paving, and for the construction and maintenance of bridges which are used by the public for highway purposes.

10. Extensions into new territory resulting in special benefits to the property in that vicinity should be paid for by assessments on such property in proportion to the benefits received, and that the amount of such assessments should not be added to the physical value of the corporate property.

11. The great increase in the use of private automobiles, the jitney and motor buses, has introduced a serious, although not a fatal, competition to the electric railway. These forms of public motor conveyance when operated as public carriers, should properly be subject to equivalent regulatory provisions.

12. The full co-operation of labor is essential to the highest prosperity and the usefulness of the industry. The employees engaged in this occupation should have a living wage and humane hours of labor and working conditions. They should have the right to deal collectively with their employers, through committees or rep-

resentatives of their own selection. All labor disputes should be settled voluntarily or by arbitration, and the award of such a board should be final and binding upon both parties. It is intolerable that the transportation service of a city should be subject to occasional paralysis, whether by strikes or by lockouts.

13. A private industry should not be subsidized by public funds, unless it is imperatively necessary for the preservation of an essential service, and then only as an emergency measure.

14. Unless the usefulness of the electric railways is to be sacrificed, public control must be flexible enough to enable them to secure sufficient revenues to pay the entire cost of the service rendered, including the necessary cost of both capital and labor.

15. There can be no satisfactory solution of the electric railway problem which does not include the fair valuation of the property employed in the public service, and where that is done, the companies should voluntarily reduce any excessive capitalization to the basis of such value.

16. There is no insuperable objection to a large, wideawake city having exclusive jurisdiction over the rates and services of public utilities.

17. The necessity for scientific and successful regulation of systems, whether large or small, and especially those which operate through several cities and villages and in rural territory, leads to the conclusion that local regulation should generally be subject to the superior authority of the State, whether as a matter of original jurisdiction or through the medium of appeal.

18. Cost-of-service contracts are in the experimental stage, but where tried, they seem to have secured a fair return upon capital, established credit and effected reasonably satisfactory public service. Such contracts may safely be entered into where the public right eventually to acquire the property is safeguarded.

19. The right of the public to own and operate public utilities should be recognized, and legal obstacles in the way of its exercise should be removed.

20. While eventually it might become expedient for the public to own and operate electric railways, there is nothing in the experience thus far obtained in this country which will justify the assertion that it will result in better or cheaper service than privately operated utilities could afford if properly regulated.

21. Public ownership and operation of local transportation systems, whether or not it be considered ultimately desirable, is now, because of constitutional and statutory prohibitions, financial and legal obstacles, the present degree of responsibility of our local governments, and the state of public opinion, practicable in so few instances, that private ownership and operation must as a general rule be continued for an extended period.

22. If the reforms incident to public regulation which we suggest in this report should not result in making private ownership satisfactory to the public, such reforms should at least enable public ownership to be established upon a just and equitable basis.

Selecting Compound Meters

The Hartford Water Department uses compound meters for all sizes over two-inch, and installs different makes, each where its peculiarities best meet the conditions of the service in question. The peculiarities of the several makes are studied, as described by J. E. Garratt, engineer of the Department, in this article.

The Board of Water Commissioners of Hartford, Conn., uses compound meters on a considerable number of services, and has investigated quite thoroughly the characteristics of each of the compound meters on the market and the conditions for which each is best suited. Some of the conclusions and conditions were described by J. E. Garratt, office engineer of the board, in a paper before the N. E. Water Works Association, from which the following is abstracted:

Compound meters are used in Hartford almost exclusively where the size exceeds 2 inches. In some cases, instead of using a compound meter, a compounding valve is purchased and used in connection with a large and small meter of ordinary make, giving such combinations as a Hersy-Crest compound meter, a Nilo-Thompson, etc. Of the several compound meters each has its own peculiarities. One may have the largest capacity of a given size, but also the greatest weight to be handled and the largest space for setting. Another may require a straight run of pipe on the inlet end in order that it may register properly; a third may be light, compact, well made and easily handled by one man, yet be of too small capacity for compound meter service. Of two having equal capacity and dependability, one may be heavier to handle but take up less space than the other; or it may be possible to dismember and enter one of them through a small opening through which the other cannot be entered.

In selecting compound meters, the Hartford Water Department considers the following points:

1. Loss of pressure at various rates, low as well as high.
2. Accuracy of registration, with special regard to the accuracy at the point where the flow begins to pass through the large meter.
3. Effect of entrance disturbances on the accuracy of registration.

In selecting, from the several kinds which it purchases, the particular meter for a given installation, the department considers further the following points:

1. Loss of pressure at the rates expected on the installation.
2. Rate at which compound valves begin to open with relation to possible uses at that point.
3. Weight in connection with meter setting.
4. Space occupied, if available space for setting meter is small.

The most serious consideration is the effect of angles or bends in the pipe on the accuracy of

registration. Several makes of compound meters are in no way affected by bends in the entrance pipe, but one or two require a straight entrance run of pipe of the same size as the meter without valves or other disturbing elements. One meter, for instance, showed the percent of flow registered to vary, when there was an elbow to the left in the inlet pipe, 7.4 per cent when there was 1 foot of straight inlet, 1.5 per cent where there was 2 feet, 4.6 per cent when there was 3 feet, and 2.4 per cent when there was 4½ feet. The same meter showed a change in percent of registration of about 2 per cent when a valve on the inlet side was three-quarters closed.

In all compound meters, at that rate of flow where the weighted check valve begins to open, the percentage of registration is low, although the sag in the percentage curve is much greater in some makes than in others. Also, the loss in pressure increases at this point, being as much as 10, 15 or even 20 pounds in some meters. One meter, for instance, showed 15 pounds pressure just before the check valves opened, the pressure dropping immediately and being only 7 pounds when the quantity passed was three times as great as that when the pressure was maximum.

There are sometimes such conditions of use that the bulk of the flow is about at the rate where the percentage of registration is low. An effort should be made in such a case to select a make of compound meter which changes from small to large meter at some other rate of flow. Mr. Garratt cited an instance in which the architect of a building with a restaurant on the top floor insisted on a 3-inch compound meter whose pressure loss mounted rapidly to 10 pounds at a rate of about 1.5 cubic feet per minute and then dropped back quickly to 2½ pounds. This building used water at a rate close to 1.5 cubic feet, and as the building was high and the pressure in the mains low at this point, it was difficult to obtain supply at the top of the building; but had a 2-inch disc meter been installed, as the department had recommended, the loss of pressure would have been less than 1 pound.

At least one type of compound meter has adjustable weights on the compounding valve so that it can be made to open at any desired rate of flow. Before this was realized by the department, it had installed such a compounding valve on a 4-inch line supplying a power station. Previous to this, a compound meter had been installed on this line and the disc of the small by-pass meter had broken and been replaced three times.

Investigation showed that the small meter had passed 600,000 cubic feet of water and the large 4-inch meter slightly less than this amount. This was remedied by removing some of the weight from the compounding valve.

Sellers of compound meters place great emphasis on the great reduction such meters make in the amount of water which passes the meter without being registered. So far the Hartford depart-

ment has not been able to get many figures on this. The compound meters have been principally new installations and the few which they have compounded themselves have been on factories and power stations where the use of water was very erratic and variable.

The department makes yearly tests of all large meters, in place, testing them on small flows as well as on large, and so keeps them in good shape.

Construction Questions Answered

Suggestions as to methods, "wrinkles" and appliances that may be used to overcome difficulties arising in construction work. We invite questions concerning such problems that may arise from time to time in the experience of any of our readers. Answers prepared by competent authorities will be published promptly. It is hoped that others who have solved similar problems differently will send us their solutions for publication also; or describe new "wrinkles." If it is only a new way to drive a nail, it may help some one.

Installing Pipes Through Railroad Embankments

In the construction, maintenance and repair of water supply and sewer systems and electric conduits, it sometimes happens to be necessary to carry pipes under railroad lines built on an embankment. Usually the railroads, whether steam or electric, have practically continuous traffic, which is especially heavy and high-speed for steam roads, so that any interruption or retarding of service, or any operations that might possibly jeopardize the road-bed, are strongly opposed and usually absolutely prohibited, thus making it impracticable to carry the pipes through the embankment by open cut in the same manner that they can be carried in other places or by supporting the tracks on overhead bridges or by diverting them temporarily on by-passes, as can often be done with street and highway traffic.

Either the contractor must find some method of construction that is unobjectionable to the railroad or sometimes, at great expense and delay, he can have the crossing made by the railroad authorities, an alternative that is generally very costly and troublesome.

The obvious method by tunneling is likely to cause troublesome settlement of the track and possibly seriously endanger traffic, because it is very difficult to tunnel close to the surface without bleeding, especially in filled or made soil and where, as in this case, it is subject to heavy loads and vibrations. In addition, the embankment is almost always of minimum width and with slopes approximating the angle of stability of the material, so that little factor of safety exists.

Even if tunneling methods were acceptable to the railroad companies, few general contractors

have competent tunneling workmen or superintendents available and should hesitate about undertaking such critical work, therefore, tunneling may well be eliminated in ordinary cases.

The question then becomes, in most cases, how to install water or sewer pipes from 4 to 36 inches in diameter and from, say, 30 to 150 feet long, at elevations 5 feet or more below rail level and not far below the original surface of the ground.

JACKING SMALL PIPES

The method of jacking has been successfully used for the installation of pipes without previous excavation through railroad embankments up to 100 feet or more in thickness. For pipes of small diameter or short length, this is a very simple and easy operation involving simply the provision of a solid bulkhead or other support to resist the horizontal reaction of a jack sufficiently powerful to drive the pipe.

The excavation is stopped at the point where its farther progress might possibly endanger the embankment; the pipe is carefully aligned both horizontally and vertically, and the jack inserted between its outer end and a bulkhead or reaction support. Provision must be made to hold the rear end of the pipe in a cradle with devices to keep it in place. Blocking or struts varying in length by the stroke of the jack, should be provided and as fast as the jack drives the pipe for its full stroke these fillers should be successively inserted until the pipe has been driven the full pipe length; then another pipe is jointed to it and both together are driven forward as before until the forward end of the first pipe emerges on the opposite side of the embankment.

For screwed pipe of small diameter the work should be easy and rapid if rocks, timber or other obstacles are not encountered and these are seldom met with in ordinary railroad embankments. For a stone embankment, of course, this method is not applicable.

For pipes up to 6 inches in diameter better

progress will probably be attained by providing a conical pilot or driving head for the forward end of the pipe, and the force required for driving would be approximately equivalent to the friction on the pipe, and up to lengths of 100 feet it would probably be within the limits of a powerful screw or ratchet jack. If one of these jacks proves insufficient, it could easily be supplemented by one or more additional jacks arranged symmetrically about the center line of the pipe and bearing against a jacking piece attached successively to each additional length of pipe jointed on.

The skin friction may vary from 50 pounds or less up to several hundred pounds per square foot of exterior surface, according to the depth below the surface, the character of material and, if below ground water level, the amount of water encountered. It is likely to be less in the embankment proper than if the pipe is being driven through the natural soil below the base of the embankment. Some idea as to whether the soil is loose and can be penetrated easily or not may be gained by inspection and by sounding with a small steel rod driven with sledge hammers, but it is impossible to calculate accurately in advance how hard the driving will be, and it is best to be assured of additional or more powerful jacks if the first one does not suffice. For loads of more than 25 tons, hydraulic jacks, which can be had up to 100 tons capacity or even more, should be used. Where one jack can be made to suffice, it is much better to use it placed in the axis of the pipe than to endeavor to use several jacks. It is likely to be difficult to locate more than two jacks for convenient operation or to drive them with exact regularity and synchronization, thus making it more difficult to maintain the alignment of the pipe.

LARGE DIAMETER PIPES

For pipes more than 6 inches in diameter it is possible to omit the pilot and to drive the pipe with the front end open, thus permitting, every time the jack is removed, the insertion of a long-handled spoon, auger, or other device to loosen or remove the earth in front of the pipe, thus facilitating the driving. With pipes of 30-inch diameter it is possible for the jacks to be arranged to bear on collars or suitable frames attached to the rear end and permitting the free entrance into the pipe of a laborer who can crawl through and continuously excavate the material in advance, provided it is of such character that there is no indication of bleeding or settlement of the track above.

If the pipe is cast iron with short lengths and hub and spigot joints, the latter will create an excessive resistance to jacking and probably, if not corrected, will make it impracticable except for short pipes of small diameter. However, if such pipe is jacketed with wood staves or some other device that provides a uniform diameter and smooth exterior surface, the resistance to jacking will be greatly reduced to correspond with that of screwed or riveted steel pipe.

For embankments not more than 10 or 15 feet high, pipes can usually be driven under two or three tracks, but if embankments are much

higher or the number of tracks much greater, the width at the base is likely to be so much increased that the difficulty of driving becomes excessive. This may be somewhat reduced in the case of high embankments by trenching into the bottom of the embankment as far as permissible on both sides, great care being taken to thoroughly sheet and brace both the sides and the forward end of the excavations so that no settlement or displacement of the embankment can occur. In this way driving may be eliminated at the toes of the embankment and be necessary only directly under and a little beyond the tracks.

DRIVING FROM OPPOSITE SIDES

Pipe large enough for men to excavate from the interior may be driven from both sides of the embankment to meet at the center, thus reducing the resistance for each section and practically doubling the possible length across it, but except for culverts or similar structures, this method would be subject to objections arising from the difficulty in making a joint between the two sections that would be satisfactory to the engineer, and the difficulty of driving with sufficient accuracy to insure a perfect meeting underneath the embankment would require extreme delicacy and precision of measurements and adjustments and very great skill in the execution of the work and might quite likely involve the necessity of a special joint that might require enlarged excavation where the pipes met.

Driving from opposite sides of the embankment might be considerably facilitated by driving a preliminary pilot rod or pipe of small diameter that could be forced through the embankment from side to side in the axis of the required location. This pilot could then be used as a center of the alignment, on which the two sections of large pipe could be threaded with suitable bearings and thus have their directions accurately controlled until they met at the center of the embankment where, however, it would be necessary to have some kind of joint that could be made from within the pipe, obviously a difficult one to design and construct.

SUPPORTING TRACKS

Where the difficulties or dimensions are very great, the jacking method, which is limited in application, must be dispensed with and special provisions made either for tunneling under expert supervision or for absolute support of the track while either tunneling or trench work is carried on under it; methods which may be indispensable but which would be costly.

This can be accomplished by driving piles on both sides of the pipe line parallel to it, and supporting on them girders that form regular bridge spans carrying the track over the pipe. The railroad company is likely to insist on performing this construction in a manner designed by its own engineer and executing it with its own force at such time as is most convenient for it, after which the contractor will be permitted to make the necessary excavation, install his pipe and pay the railroad's bill, a contingency which should be allowed for in the estimates unless he is assured that the jacking method will be practicable and acceptable.

Recent Legal Decisions

WHETHER ADDITIONAL MATERIAL PAYABLE FOR AT CONTRACT PRICE OR ON QUANTUM MERUIT

A contractor contracted to furnish material and build a bridge in accordance with certain plans and specifications, payment to be made on the basis of the weight of material used. On a subsequent change of the plans, requiring a materially longer bridge and more material, but of the same kind, the contractor without objection proceeded and built the bridge. In an action for the balance due it was held, *Keystone Structural Co. v. Live-Belt Co.*, 265 Fed. 320, that the price was to be measured by the contract, and not, as claimed by the contractor, on quantum meruit. The doctrine that a change in the subject-matter of the contract, as the common phrase expresses it, "breaks the contract," is an accepted, because necessary, doctrine, when the principle on which it rests applies. Whatever work is done, or materials are supplied, if not done or supplied at an agreed price, must necessarily be priced on a quantum meruit. The doctrine does not apply, however, when the subject-matter of the contract can be found in what is performed, and the change is only by way of addition of other work and material. The familiar cases of contract price and "extras" arise from this. The "extras" only are the subject of the implied contract, and necessarily so, because the contract price for one thing cannot measure a different thing. When, however, the change is only by way of additional units, the contract price governs. There is, of course, no obligation to supply more than is called for by the contract; but, if what is supplied is nothing more than additional units of the things contracted for, the fair implication is the parties have agreed to change the subject-matter of the contract, or there is an implied agreement on the same price. If a contractor is unwilling to exceed his contract obligation on the contract terms, he has only to say so; but if he is willing he may, and his doing it justifies the finding of his agreement to do so. Of course, if the contract price cannot be applied to what is done beyond the contract, it is necessary, as well as equitable, to resort to an implied quantum meruit contract.

RIGHTS OF SURETY AND ASSIGNEE OF CONTRACTOR IN MONEY RETAINED

A construction contract authorized the board of road commissioners to retain 15 per cent of the monthly estimates, and the surety on the contract was subrogated to and had assigned to it the rights of the board. It is held, *O'Neil Engineering Co., v. First Nat. Bank of Paris (Tex.)* 222 S. W. 1091, that the contractor's assignment of the remaining 85 per cent. gave its assignee rights superior to the board and surety so long as the contractor was carrying on the work and not in default. The contract provided that the 15 per cent. retained should be paid on or before the fourth Monday of the month

following that in which the work was performed. The warrant for the work done in the previous month, although approved on the 4th of the month, had not been delivered on the 8th of the month, when the contractor defaulted. A bank which had an assignment of warrants to become due demanded payment. It is held that the board was warranted in retaining the amount because of default, so that the rights of the surety, to which had been assigned all sums retained, etc., were superior to those of the bank.

PART OF PAYMENT TO BECOME DUE BY CITY TO CONTRACTOR HELD ASSIGNABLE

In an action against a contractor by the assignee of part of a payment to become due by a city on performance of a contract, the New York Court of Appeals holds, *Hinkle Iron Co. v. Kohn*, 128 N. E. 113, that the creation of ownership of so much of the fund as was assigned was not dependent upon the consent of the city to, or the filing of, the assignment. Nor was it affected by the fact that the debt was to be created and the payment was to become due, or that the assignment was of the part only of the designated payment. The test was whether or not the assignment made an appropriation of the fund, so that the debtor would be justified in paying the debt or the assigned part to the person claiming to be the assignee. The assignment satisfied the test. The contractor received the entire sum of the payment from the city, which largely exceeded the sum assigned to the plaintiff, and deposited the sum to its credit in a bank. After payment, the sum was in the contractor's possession as a special deposit or bailment for the plaintiff's benefit. The contractor could not lawfully appropriate it to another purpose. It could not convert or misappropriate it, without making itself liable to the plaintiff for the amount converted. The plaintiff was therefore entitled to recovery of the sum assigned.

WETTING DOWN CURB EXTENDED TIME FOR FILING LIEN NOTICES

An appeal by the sureties on a contractor's bond under the California Vrooman Street Improvement Law, the plaintiff having sued for materials furnished by it for a concrete curb, the principal question was whether the lien notices filed with the street superintendent were filed within 30 days from the time the improvement was completed. The contract required wetting down the curb for seven days. The work was to be done to the satisfaction of the superintendent, who required wetting down for ten days, which the contractor did under his protest that the work for the last three days was, nevertheless, done under the contract. It was held, *Barr Lumber Co. v. Joy Const. Co. (Cal.)*, 190 Pac. 844, that the time for filing lien notices dated from the completion of the ten days.

NEWS OF THE SOCIETIES

Oct. 12-14—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. St. Louis. Secretary, Charles Carroll Brown, 401 Lincoln Avenue, Valparaiso, Ind.

October 13-15—AMERICAN CIVIC ASSOCIATION. Annual convention, Amherst, Mass. Secretary, E. F. Marshall, Union Trust Bldg., Washington, D. C.

October 16-19—AMERICAN COUNTRY LIFE ASSOCIATION. Annual conference, Springfield, Mass. President, Kenyon, L. Butterfield, Amherst, Mass.

Oct. 19-22—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. 25th annual convention, New Orleans, La. Secretary, C. R. George, Houston, Texas.

OCT. 26-28—AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION. Convention at Atlanta, Ga. Headquarters, Chicago.

November 12—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Second Fall meeting, Chicago. Sec., 33 W. 39th St., New York.

Nov. 15-17—CITY MANAGERS ASSOCIATION. Annual convention at Cincinnati, O. Executive Secretary, Harrison G. Otis, 812 Tribune Bldg., New York City.

Dec. 7-10—AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, New York. Secretary, 29 W. 39th St., New York City.

Jan. 25-27, 1921—THE AMERICAN WOOD PRESERVERS ASSOCIATION. Place of meeting to be announced later.

AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS

The twenty-sixth annual convention will be held at the Planters Hotel, St. Louis, Mo., October 12, 13, 14, 15, 1920.

The program commences with a golf tournament on the municipal course at 2:00 p. m., October 11.

At 8:00 p. m. there is a preliminary joint meeting of executive committee and finance committee and meetings of committees on specifications.

OCTOBER 12

9:00 a. m.—Registration and executive committee meeting. 9:00 to 11:00 a. m.—Meetings of committees on specifications as follows: 9:00—Bituminous Macadam, Bituminous Concrete and Asphalt Block Pavements, Brick Pavements, Stone Block Pavements. 9:30—Sheet Asphalt Pavements, Cement Concrete Pavements, Wood Block Pavements. 10:00—Broken Stone and Gravel Roads, Sidewalks and Curbs, Sewers. 10:30—Foundations for Pavements.

11:00 a. m.—Opening of the convention. Address of Welcome: Mayor Henry W. Kiel; Response: Col. R. Keith Compton, First Vice-President. President's Address: George H. Norton. Report of Executive Committee. Report of Secretary. Report of Treasurer. Report of Finance Committee. Selection of committees on nominations, place of meeting and resolutions. Introduction of proposed amendments to constitution, and other new business. Report of Committee on Public Markets. Report of Committee on Water Works and Water Supply. Report of Committee on Municipal Legislation and Finance. Report of

Committee on Street Cleaning, Refuse Disposal and Snow Removal. Methods of Snow Disposal.

12:30 p. m.—Round table discussions at lunch on enlargement of society's activities; co-operation with national highway council; with American engineering standards committee; extension of standard specifications to other subjects; increase in number of committees, e. g., street-car track construction, pavement maintenance, road and pavement sub-grade, pavement foundations; sub-division of existing committees, etc.

Relations of associate members to committees, to membership on committees, to privileges of the floor, etc. Financial outlook of the society under the increased cost of living: how shall increased expense be met. Oiling of unimproved streets, resurfacing of old brick pavements; rejuvenating of wood-block pavements; excavations for surface cuts in pavements. Zoning; general city planning; city lighting.

The plan, subject to change, is for groups interested in certain subjects to gather about assigned tables, each of which will be in charge of a chairman. To make this plan successful each member must, on registering, designate the subject in which he is specially interested, that the tables may be properly assigned and filled.

Geo. W. Tillson, E. R. Dutton, Harland Bartholomew, Geo. H. Norton, R. K. Compton, E. S. Rankin, W. W. Horner are some of those selected as leaders. If the round table on Tuesday noon promises success, others will be arranged for at breakfast at 8:00 promptly each morning.

TUESDAY AFTERNOON

Report of Committee on Street Lighting. Street Illumination—Hugo Wurdack, President of National Light and Development Co., St. Louis, Mo. Street Lighting in St. Louis—Ralph Toensfeldt, Engineer Department of Public Utilities, St. Louis, Mo. Street Lighting and Traffic Accidents—Ward Harrison, Illuminating Engineer, National Lamp Works, Cleveland, Ohio. The St. Louis Water Works—E. E. Wall, Water Commissioner, St. Louis, Mo.

Report of Committee on Fire Prevention. Fire Prevention and Fire Fighting—Clarence E. Ridley, City Engineer, Port Arthur, Tex. Valley Forge—S. Cameron Corson, Borough Engineer, Norristown, Pa. (Illustrated). Municipal Finance. Louis Nolte, City Controller, St. Louis, Mo. 8:30 p. m.—Reception in the parlors of the Planters Hotel followed by dancing.

OCTOBER 13—MORNING

Report of Committee on Sewerage and Sanitation. The Work of the Sanitary District of Chicago, Past, Present and Future, from a Sanitary Standpoint—Langdon Pearse, Sanitary Engineer, Chicago, Ill. The St. Louis Sewer System—W. W. Horner, Chief Engineer Paving and Sewerage, St. Louis, Mo. (Illustrated). Unusual

Structures in the St. Louis Sewer System—Guy Brown, Engineer of Sewer Design, St. Louis, Mo. Grit Chambers for Sewage Disposal Works—George B. Gascoigne, Sanitary Engineer, Cleveland, Ohio. The Present Status of the Activated Sludge Sewage Disposal Process—Edward Bartow, Director of State Water Survey, Urbana, Ill. The Disposal of Trade Wastes—Robert Spurr Weston, Consulting Sanitary Engineer, Boston, Mass. The Miles-Acid Process on Tannery Sewage Waste—E. S. Dorr, Engineer in Charge of Special Work, Sewer Department, Boston, Mass. (In Advance Papers). Ten Years' Operation of Municipal Garbage Reduction Works—Walter B. Bee, Superintendent of Municipal Reduction Works, Columbus, Ohio.

2:00 p. m.—Automobile ride, visiting the Municipal Building Group and passing over the most recent paving projects under construction en route to the great industrial district developed during the past three years. Later visiting Washington University and Forest Park, where a stop will be made for luncheon and an opportunity given to see the St. Louis Zoo, the Municipal Art Museum and the Municipal Theater. The ride will be continued over the Railroad Section to Shaw's Garden, the south-side residence district, and Reservoir Park.

8:00 p. m.—Election of officers and selection of place of meeting. Report of Committee on City Planning—Harland Bartholomew, Chairman, Engineer of City Plan Commission, St. Louis, Mo. The St. Louis City Plan—E. R. Kinsey, President of Board of Public Service, St. Louis, Mo. The Zoning Plan Recently Adopted for Washington, D. C.—Harland Bartholomew, Engineer City Plan Commission, St. Louis, Mo. Pittsburgh Problems in City Planning, Due to Rugged Topography (Illustrated)—N. S. Sprague, Chief Engineer, Bureau of Engineering, Pittsburgh, Pa. (Abstract in Advance Papers.) Highways for Traffic in Town and Country—Nelson P. Lewis, Chief Engineer, Board of Estimate and Apportionment, New York City. The Construction of Municipal Bridges and Buildings in St. Louis—L. R. Bowen, Engineer of Bridges and Buildings, St. Louis, Mo. Suggestions from European Practice in Municipal Improvements—George B. Ford, Director City Planning Department, Technical Advisory Corporation, New York City (Illustrated). The Relation of Zoning to the Work of the City Engineer—E. S. Rankin, Engineer Bureau of Sewers, Newark, N. J.

OCTOBER 14—MORNING

Report of Committee on Street Paving, Sidewalk and Street Design. Producing and Refining of Asphalt—Herbert Spencer, Engineer Standard Oil Company of New Jersey, New York City (Illustrated). (Abstract in Advance Papers.) Asphaltic Pavement Construction on Illinois State Highway and Chicago Boulevard Link (Illustrated)—John B. Hittell, District Engineer, The Asphalt Association, Chicago, Ill. The Elimination of Unnecessary Testing from Asphalt Specifications—R. R. Barrett, Engineer The Texas Company, New York City. Asphalt Block Pavements—P. L. Thomp-

son, Hastings Pavement Co., New York (In Advance Papers). The Present Status of Macadam Base for Bituminous Pavements—Julius Adler, Technical Engineer The Atlantic Refining Co., Philadelphia, Pa. (Abstract in Advance Papers). Wood Block Paving—Herman Von Schrenk, Consulting Engineer, St. Louis, Mo. Concrete for Municipal Paving—Col. H. C. Boyden, The Portland Cement Association, Chicago, Ill. Paving Brick and Brick Pavements, Special Features—J. C. Travilla, Consulting Engineer, St. Louis, Mo. Brick vs. Block for City Street Paving—S. Cameron Corson, Borough Engineer, Norristown, Pa. (In Advance Papers). Gravel: A Plea for Common-Sense Specifications—Wallace F. Purring-ton, Chemist and Testing Engineer State Highway Department, Concord, N. H. (In Advance Papers). Specifications and Tests for Road Gravel—F. H. Jackson, Testing Engineer U. S. Bureau of Public Roads, Washington, D. C. The Protection of Gravel Roads by Surface Treatments—Philip P. Sharples, Manager General Tarvia Department, The Barrett Company, New York City.

12:30 p. m.—Round table discussion at lunch. Subjects listed under Tuesday Noon may be discussed or proposed changes in specifications may be taken up. Asphalt, brick, cement-concrete, stone-block, wood-block, sidewalks and curbs, sewers, foundations of pavements, treatment of pavement sub-grade.

THURSDAY AFTERNOON

Reports of Committees on Specifications. Action on proposed amendments to the constitution. Report of Committee on Resolutions.

8:30 p. m.—Smoker and the morality play, "Every Engineer." A unique production by the "Engineer Players," a group of members of the Engineers' Club of St. Louis, who do not take themselves too seriously but who "point a moral and adorn a tale." An informal evening for delegates and their ladies, in charge of the Engineers' Club and the Ladies' Committee.

OCTOBER 15—MORNING

Report of Committee on Traffic and Transportation. Relation of the Proposed Uniform Vehicle Law to Municipal Traffic Regulations—Henry G. Shirley, Secretary of Federal Highway Council, Washington, D. C. Pavement Foundations as a Factor in Economic Transportation—Robert C. Barnett, Consulting Civil Engineer, Kansas City, Mo. Width of Roadways for Different Classes of Streets—Robert Hoffmann, Commissioner, Division of Engineering and Construction, Department of Public Service, Cleveland, Ohio. Report of Committee on Standard Tests for Bituminous Materials. Housing—Nelson Cunliff, Secretary and Manager, Home and Housing Association, St. Louis, Mo.

12:30 p. m.—Round table discussions will be continued at lunch.

2:00 p. m.—There will be a special trip on the steamer *Erastus Wells*, the harbor boat of the city of St. Louis, along the northern water front, stopping at the new St. Louis Municipal Docks, a large portion of which structure is now in full operation, while other units are still under construction,

and going to the St. Louis Water Works at the Chain of Rocks, and return.

SECTIONS OF AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS CINCINNATI

September 9, 1920, Assembly Hall, Union Gas & Electric Company. The speaker of the evening was Mr. P. M. Lincoln, a past-president of the Institute, who gave a very interesting talk on the history of the Institute. The second part of Mr. Lincoln's program was on the electrification of steam roads.

DENVER

August 19, 1920, Savoy Hotel. This special meeting was called in honor of Secretary Hutchinson, who talked to the members about Institute affairs. Mr. H. B. Dwight told something of his experiences at the annual convention.

UNIVERSITY OF CALIFORNIA

August 25, 1920. Talk on "Westinghouse Junior Courses" by Messrs. Andrews, Baston and Cates.

UTAH

August 16, 1920, Commercial Club. Speaker, Mr. F. L. Hutchinson, secretary of the Institute. Subject, "Institute Activities."

SECTIONS OF AMERICAN SOCIETY OF CIVIL ENGINEERS TEXAS SECTION

At the fall meeting in Austin, October 20-21, papers will be presented on "Concrete Construction," by G. G. Wickline, bridge engineer, State Highway Department; "Probable Flood Discharge of a 48 Square Mill Area Near Paris, Tex.," by Major John B. Hawley, consulting engineer, Fort Worth; "Early Irrigation in Texas," by E. P. Arneson, consulting engineer, San Antonio; "Manufacture of Pipe and Clay Products Used in Sewer Construction," by M. C. Erwin, sewer engineer, city of San Antonio; "Contributing Factors to the Increasing Cost of Road Building," by T. H. Webb, State Highway Department; "Presentation of and Discussion on 'Standard Form of Contract with Arbitration Clause,'" by Major John B. Hawley; "Organization and Progress on the Dallas Levee District," by E. N. Noyes, district engineer and secretary-treasurer of the section.

PHILADELPHIA SECTION

At the meeting of September 13, the Philadelphia Section voted endorsement of amendments "A," "B," and "C" to the constitution, thus confirming the previous action of their Committee on Development.

ILLINOIS SECTION

At a Chicago meeting, September 17, the proposed amendments to the constitution were vigorously discussed and it was unanimously resolved to reject amendments "A," "F," and "G."

AMERICAN CHEMICAL SOCIETY

At the semi-annual meetings in Chicago, September 6-10, the Council decided not to affiliate with the Federated American Engineering Societies, believing it would be more desirable

to promote co-operation upon an independent basis and thus avoid subordination of chemical activity to strictly engineering service.

The council also urged local sections to refrain from affiliating with other local engineering and technical societies in state or district federations.

PERSONALS

Schenk, T. M., district engineer, Public Works Department of Canada, Halifax, Nova Scotia, died at Montreal September 4.

Hardy, A. W., has been appointed resident engineer of the Minco-Union City bridge, Oklahoma.

Davis, J. C., has been appointed testing engineer for the State Highway Department, Oklahoma.

Jervy, Col. J. P., Corps of Engineers, U. S. A., in charge of the Baltimore district, has made application for retirement.

Buswell, Dr. A. M., associate professor of engineering, Columbia University, has been appointed director of the Illinois State Water Survey.

Allen, J. P., recently U. S. assistant district engineer, Charleston, S. C., has opened an engineering office at Charleston.

Parker, J. L., has been made special bridge engineer of the South Carolina State Highway Commission.

Seaton, R. A., has been appointed dean of engineering at Kansas State Agricultural College.

Fuller, C. H. R., has been appointed city engineer of Chatham, Ont.

Powell, Major, R. G., has been made assistant to Gen. Harry Taylor in charge of the river and harbor work of the Corps of Engineers.

Walton, Col. E. G., Chamberlain, Lt. Col. F. G. and Fredntll, Lt. Col. I. L., have been appointed officers in charge of the district headquarters of Construction Service in Washington, D. C., in San Antonio, and in San Francisco, respectively.

Trimble, E. E., has been appointed as full-time secretary of the Nebraska State Assembly of the American Association of Engineers with headquarters in Omaha.

Butler, Drury, has been appointed engineer of Sacramento County, Cal.

Connor, F. G., has been reappointed superintendent of water works Sioux Falls, S. Dak.

Wedt, Professor Wylie, has been appointed professor of civil engineering at the South Dakota School of Mines.

Howe, S. B., has been reappointed city engineer of Sioux Falls, S. Dak.

Largewell, A. C., has been made engineer of Shawnee County, Kan., head quarters at Topeka.

Wright, P. F., draftsman of the U. S. Engineer's Office, Charleston has been transferred to the office of the District Engineer, Baltimore, Maryland.

Blomquist, H. M., has been appointed superintendent of the Cedar Rapids Iowa, water-works system.

Bean, L. V., has been appointed chief engineer of roadways for the Georgia, Florida & Alabama Railroad.

Williams, G. M., has been appointed professor of civil engineering University of Saskatchewan.